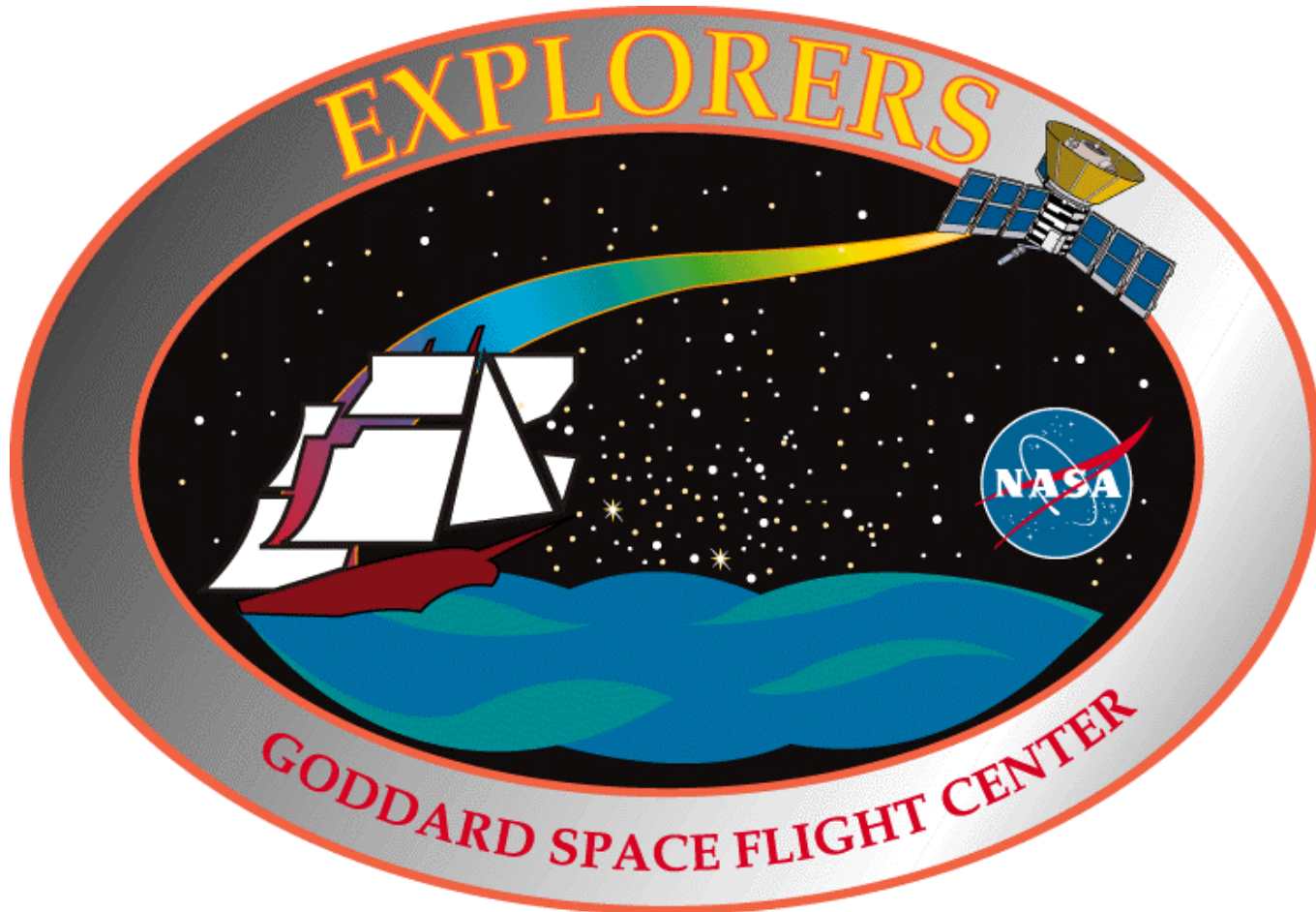


February 21st, 2003 SMEX AO Kickoff Meeting

Safety, Reliability, & Quality Assurance Overview

Rick Claffy, GSFC Code 410/303, X6-7866



February 21st, 2003 @ Marriott,
Greenbelt

SMEX PI Missions Kickoff Meeting SR&QA

- **Necessary SR&QA effort is defined in SMEX AO, Appendix C, Document (SMEX SR&QA Requirements).**
 - **Discusses Explorer Program Office & PI joint effort to define best mix of roles and responsibilities for SR&QA execution.**
 - **Code 410/PI SR&QA Insight Agreement.**
 - Becomes part of GSFC/PI Contract as a condition for confirmation.
 - Defines Early the Inter-Institutional Partnering Arrangement for SR&QA services.
 - **Drafted by GSFC, negotiated, updated, signed by PI/PM & Explorer PM.**
 - **Requires PIs to implement a product assurance program that is consistent with ISO 9000 series ANSI/ASQC Q9001-1994.**
 - **ISO registration not required, but a significant degree of conformity is expected with the Standard's sections where a good fit exists and it makes sound engineering or programmatic sense.**
 - **Program must ensure SMEX Safety, Reliability, and Quality Assurance Requirements are met.**
 - **Tailoring allowed in most assurance technology areas, but ...**
 - **The highly specialized discipline of System Safety is dictated by Air Force EWR 127-1, enforced for NASA via GSFC System Safety Office. Historically, expert guidance through this difficult process has been needed by PI teams.**

SMEX PI Missions Kickoff Meeting SR&QA

- **Specifics of PI SR&QA Program to be worked out with Explorers during definition phase.**
 - **SMEX SR&QA Requirements are basis for PI SR&QA Program & associated documentation.**
 - **Working level discussions invited on all SR&QA technology topics.**
 - **Establish basis for Insight Agreement.**
 - **Mutual understanding of how implementation will meet requirements.**
 - **Share historical experience from past PI Mode SMEX missions.**
 - **PI Quality Manual, PAIP, or equivalent deliverable document to be reviewed by GSFC for approval during Phase B.**
- **SMEX SR&QA document Highlights:**
 - **Invokes Hi-Reliability Workmanship standards.**

SMEX PI Missions Kickoff Meeting SR&QA

- **Strongly Urges flight Printed Wiring Board Coupon DPA by certified facility prior to population with flight EEE parts.**
- **Requires a PI Failure Reporting System for phase C/D/E.**
- **Lays out Design Review Requirements.**
- **Details specific System Safety program requirements and deliverables with process flow descriptions (Appendix C).**
 - **Magnitude of System Safety effort must not be under-estimated.**
 - Allocate/identify roles & resources.
 - Get the right people.
 - Start early.
 - **GSFC can help in numerous ways.**
- **EEE Parts Selection criteria per GSFC 311-INST-001 or equal.**
 - **PI shall maintain and review Parts Lists with GSFC.**
 - **PI shall use an organized system to manage parts application, evaluation, and use.**
 - **Includes mandatory GIDEP Alert, NASA Advisory, GSFC PMC query responses.**

SMEX PI Missions Kickoff Meeting SR&QA

- Materials and Processes program required as typical for GSFC sponsored missions.**
- Reliability**
 - Risk assessments made and mitigation strategies identified.**
 - FMEA/Probabilistic Risk Assessments (see chart 6).**
- Software**
 - Code to be structured, error free, and maintainable.**
 - Establish & document SW requirements, external interface specs, user guides.**
 - Internal (peer) and external software design reviews.**
 - IV&V.**
 - Formal SQA with associated deliverables.**
- Verification**
 - Verification/test program to ensure all mission requirements are met.**
 - Documentation to include verification matrix, environments matrix, and test procedures.**

SMEX PI Missions Kickoff Meeting SR&QA

- **Special Emphasis Items:**
 - **Integrated Independent Review Team.**
 - Team expectations can exceed traditional baseline technical design review requirements.
 - Reviewers w/ Extra, process related questions deriving from old Red Team charter.
 - RFA trail & Failure Report closures thoroughly checked by IIRT.
 - GSFC Policy has shifted to Code 301 Chaired Reviews for PI Missions.
 - **Reliability Emphasis On:**
 - Probabilistic Risk Assessment (PRA).
 - Fault Tree Analysis, etc.
 - FMEA @ subsystem level.
 - Identify all single string design features.
 - Failure Impacts/mitigation.
 - **Tangible Continuous Risk Tracking & Management System.**
 - **Software IV&V.**
 - Each mission evaluated for SW complexity/risk/need.
 - Determination of appropriate level of IV&V involvement via standardized criteria.
 - **Lessons Learned Information System.**
 - **Orbital Debris Analysis.**

SMEX PI Missions Kickoff Meeting SR&QA

Mission Success is the GSFC Center Director's Ultimate Responsibility to the NASA Administrator.